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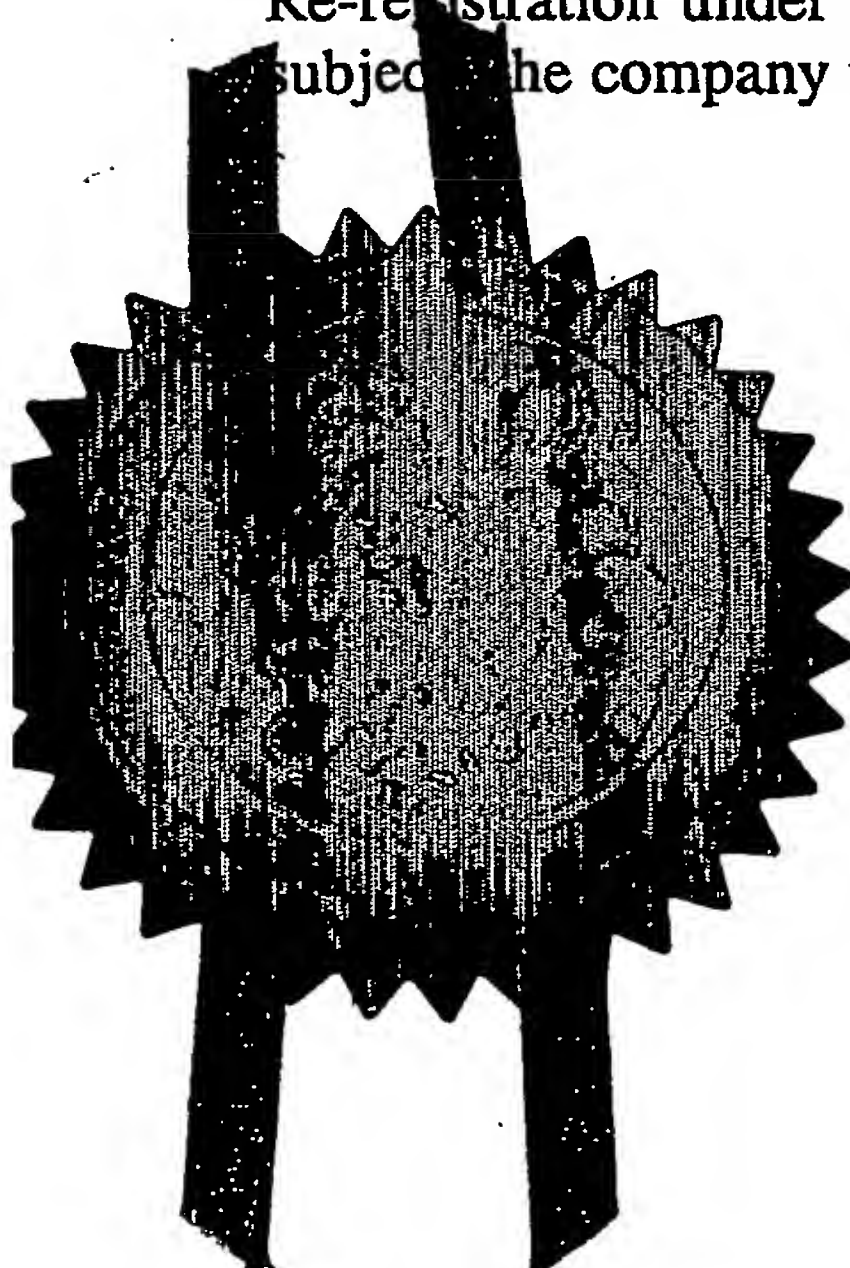
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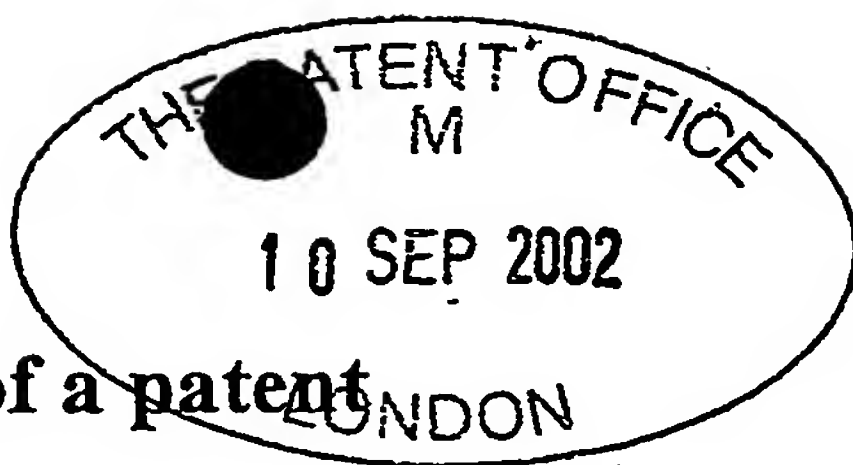
Signed

He Behen

Dated

2 October 2003

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11 SEP 02 E747122-1 002906
P01/7700 0.00-0220950.0

Request for grant of a patent

1. Your reference GAF/37405.GBA

2. Patent application number 0220950.0

3. Full name, address and postcode of the or of each applicant (*underline all surnames*)

NSK Steering Systems Europe Limited,
Belmont Place,
Belmont Road,
Maidenhead,
Berkshire. SL6 6TB

10 SEP 2002

Patents ADP number

If the applicant is a corporate body, give the country/state of its incorporation

Maidenhead, Berkshire

8219719002

4. Title of the invention

CLAMPING APPARATUS FOR ADJUSTABLE
STEERING COLUMN FOR A VEHICLE

5. Name of your agent (*if you have one*)

RAWORTH MOSS & COOK,

"Address for service" in the United Kingdom to which all correspondence should be sent

36 Sydenham Road,
Croydon, Surrey, CR0 2EF
United Kingdom.

Patents ADP number

0001362001

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or each of these earlier applications and (*if you know it*) the or each application number

Country

Priority application
number

Date of filing

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

8. Is a statement of inventorship and of right to grant of a patent required in support of this request?

Yes

Answer yes if

- a) any applicant named in part 3 is not an inventor,
or
- b) there is an inventor who is not named as an applicant
- c) any named applicant is a corporate body

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Continuation sheets of this form

Description 4 ✓
 Claim(s) 2 ✓
 Abstract 1 ✓ w
 Drawing(s) 2 + 2 ✓

10. If you are also filing any of the following, state how many against each item.

Priority documents

Translations of priority documents

Statement of inventorship and right to grant of a patent
(Patents Form 7/77) 1+2 ✓
 Request for preliminary examination and search *(Patents Form 9/77)* 1 ✓
 Request for substantive examination *(Patents Form 10/77)*
 Any other documents *(please specify)*

11.

I/We request the grant of a patent on the basis of this application

Signature

Date

Raworth Moss & Cook

RAWORTH MOSS & COOK

10 September, 2002

12. Name and daytime telephone number of person to contact in the United Kingdom

FEAKINS - 020 8688 8318

CLAMPING APPARATUS FOR ADJUSTABLE STEERING COLUMN
FOR A VEHICLE

This invention relates to a clamping apparatus for
~~5 an adjustable steering column for a vehicle.~~ Space
factors are often needed to be taken into account when
constructing steering column assemblies, particularly in
the region of the driver of a vehicle, where steering
column clamping mechanisms are generally located.

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According to the present invention, there is
provided a clamping apparatus for an adjustable steering
column for a vehicle, the clamping apparatus including at
least two, relatively slidable plates that can be clamped
15 relatively to one another, the two plates having
relatively slidable, clamping surfaces that contact one
another, the respective clamping surfaces of the two
plates being made of material of different hardnesses.

20

One of the plates may be used in connection with
reach adjustment of the steering column and the other
plate may be used in connection with rake adjustment of
the steering column. However, both plates could form
part of the reach adjustment or part of the rake
25 adjustment apparatus.

25

More than one plate of each type may be provided to
form a pack of clamping plates. In such a case, it is
intended that alternate plates will be of different
30 hardnesses.

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One of the plates may be made of a metal such as
mild steel and the other plate can be made of a metal
such as mild aluminium or aluminium alloy.

The invention also extends to an adjustable steering column for a vehicle incorporating a clamping apparatus essentially as defined above.

5 ~~Of course, the invention also extends to a vehicle~~
incorporating such an adjustable steering column, which may be rake and/or reach adjustable.

10 For a better understanding of the invention and to show how the same may be carried into effect, reference will now be made, by way of example, to the accompanying drawings, in which:-

15 Fig. 1 is a diagrammatic exploded perspective view of part of a clamping apparatus for an adjustable steering column for a vehicle; and

20 Fig. 2 is a chart comparing the use of clamping plates made of standard mild steel alone with clamping plates made of a combination of soft and hard materials, such as alternate plates being made of mild steel and mild aluminium, respectively.

25 Referring to the drawings, Fig. 1 shows a pair of clamping plates 1, which in the example shown are used for reach adjustment of a steering column (not shown) in combination with a pair of clamping plates 2 which in the example shown are used for rake adjustment of the steering column. As is clearly seen, the plates 1 and 2
30 are alternately disposed relatively to one another.

To provide the required soft-hard combination, the plates 1 are, for example, made of a comparatively soft material, whilst the plates 2 are made of a comparatively harder material.

5

When the plates are clamped together to form a clamping pack, the oppositely-facing surfaces of the plates naturally contact one another. Any number of plates can be provided. Normally, one pack of plates would be provided on one side of a steering column and another would be provided on the opposite side of the column.

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When the plates are in their clamped condition, the surfaces of the tougher material on the plates 2 contact the surfaces of the softer material of the plates 1 and this creates increased friction through the clamping system and as a result of the differences in the hardness of the surfaces.

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When the suggested material used is mild aluminium with mild steel between the reach and rake adjustment plates, when the plates are in a clamped condition during vehicle crash the plates begin relative sliding movement and the aluminium begins to shear on the surface of the plate 1 due to the action of the tougher mild steel material of the plate 2. This has the tendency to increase or provide a build-up of aluminium material, which in turn increases the clamping load. This in turn adds to the friction and stiction performance as illustrated in the chart shown in Fig. 2.

The table shown below provides some figures that have been obtained under test.

SOFT-HARD COMBINATION		Breaking Point	Transverse Loads
		kN	kN
	STANDARD MILD STEEL	0.554	0.370
	SOFT-HARD COMBINATION	1.480	2.520

It will be appreciated that with the use of soft and hard materials for the plates 1 and 2, the number of and even thickness of the reach and rake plates can be modified, especially since a friction coating on the plates need not be provided. This means that the packaging size of the clamping mechanism can be reduced as can be the weight of the mechanism.

Claims

1. A clamping apparatus for an adjustable steering column for a vehicle, the clamping apparatus including at
5 ~~least two, relatively slidable plates that can be clamped~~
relatively to one another, the two plates having relatively slidable, clamping surfaces that contact one another, the respective clamping surfaces of the two plates being made of material of different hardnesses.
- 10 2. An apparatus according to claim 1, wherein one of the plates is used in connection with reach adjustment of the steering column.
- 15 3. An apparatus according to claim 1 or 2, wherein one of the plates is used in connection with rake adjustment of the steering column.
- 20 4. An apparatus according to claim 1, 2 or 3, wherein one of the plates is made of mild steel.
- 25 5. An apparatus according to any one of the preceding claims, wherein one of the plates is made of mild aluminium or aluminium alloy.
6. A clamping apparatus for an adjustment steering column for a vehicle, substantially as hereinbefore described, with reference to the accompanying drawings.
- 30 7. An adjustable steering column for a vehicle incorporating a clamping apparatus according to any one of the preceding claims.

8. An adjustable steering column according to claim 7, which is rake and/or reach adjustable.

9. A vehicle incorporating an adjustable steering

..... 5 ~~column according to claim 7 or 8.~~

ABSTRACT

CLAMPING APPARATUS FOR ADJUSTABLE STEERING COLUMN
FOR A VEHICLE

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A clamping apparatus for an adjustable steering column for a vehicle includes at least two, relatively slidable plates (1, 2) that can be clamped relatively to one another. More than two plates can be provided to form a pack of plates. Alternate plates have relatively slidable, clamping surfaces that can contact one another, the respective clamping surfaces of the two plates being made of material of different hardnesses. In use, the softer material of one of the plates will deform due to the rubbing of the material of the harder plate and this increases stiction and friction, thereby converting friction into a shear stress load.

(Fig. 1)

1/2

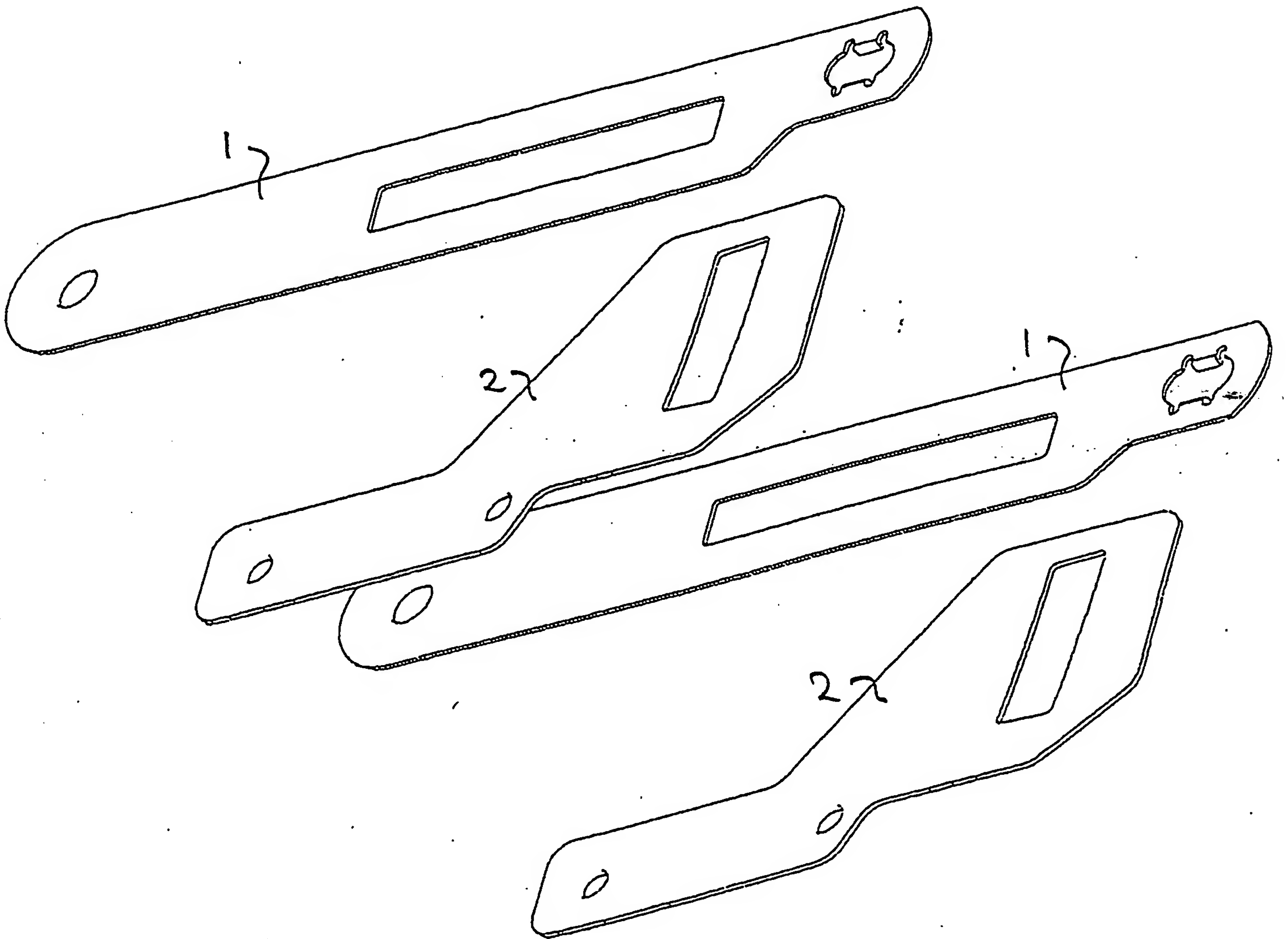


FIG. 1

2/2

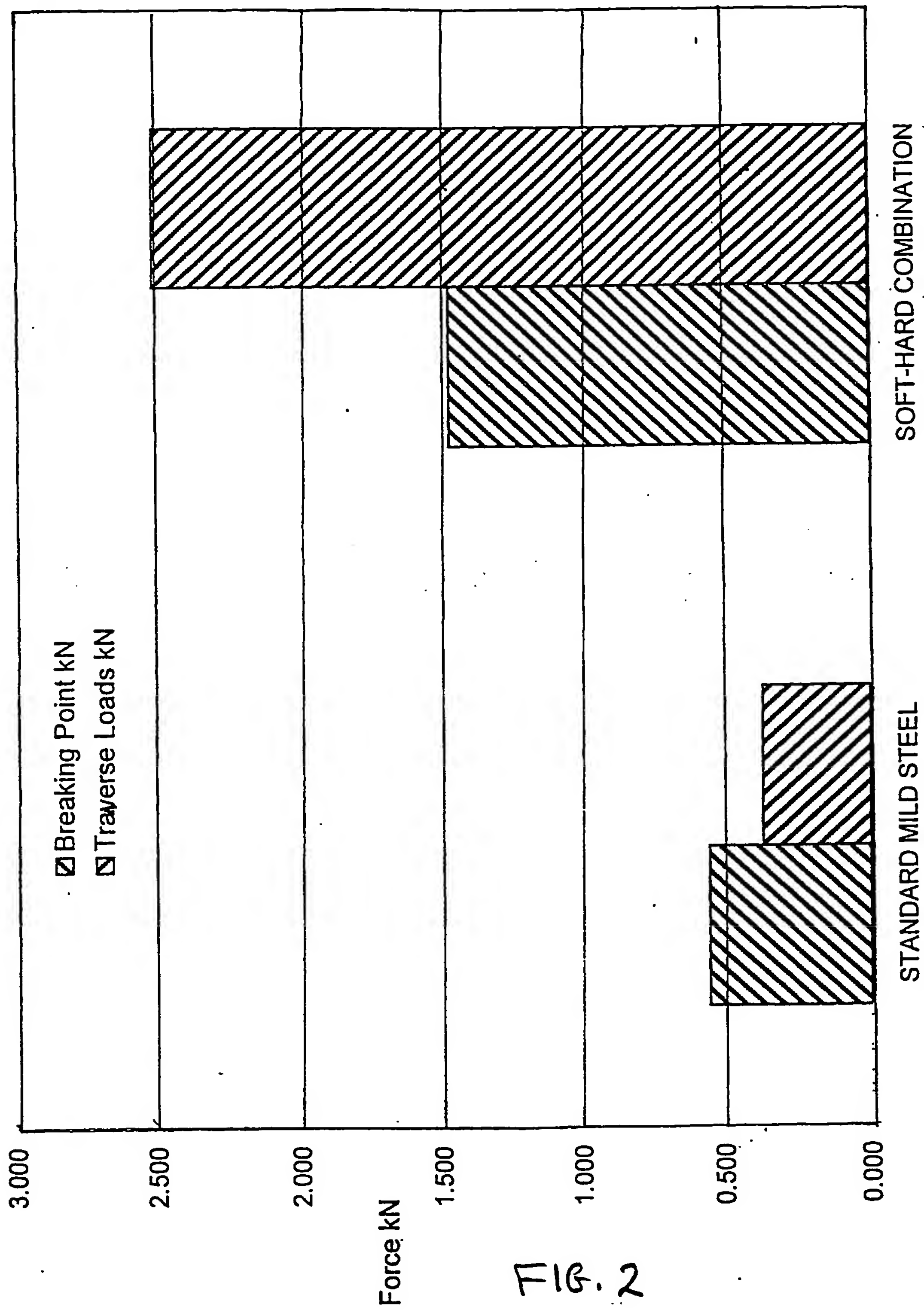
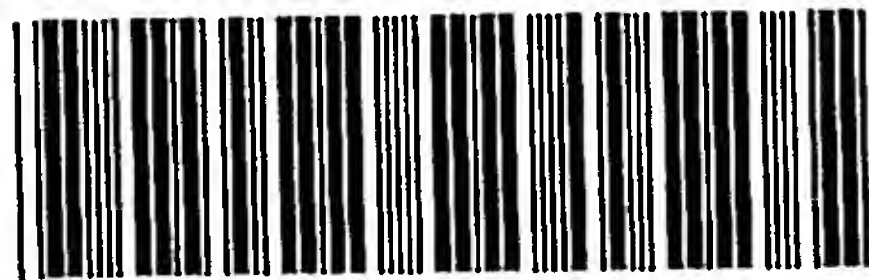


FIG. 2

PCT Application
GB0303903



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